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Date: 20 November 2016

To,
Executive Director
Krishi Gobeshona Foundation (KGF)
AIC Building (3rd Floor), BARC Complex,
Farmgate, Dhaka-1215

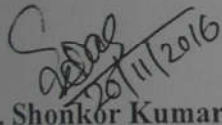
Through: Proper Channel

Subject: Submission of the Project Completion Report (PCR) of the KGF project TF 12-L.

Dear Sir,

In response to your letter dated 04/10/2016 [Memo No: KGF BKGET 1st Call (2013)/TF 12-L 449 (18) (18)], I am sending two (2) copies of the Project Completion Report (PCR) of the KGF project TF 12-L for your kind consideration and necessary action.

Sincerely yours,


20/11/2016

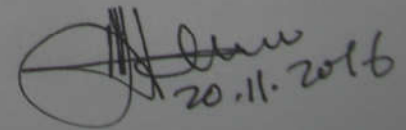
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And,

Principal Investigator (PI) cum Project Coordinator (PC)
Title: *Investigation on livestock diseasesin hilly areas*
Project ID: TF 12-L
Year: 2013-2016

DR. SHONKOR KUMAR DAS
Principal Investigator (PI)
Investigation onhilly areas
KGF Project Code: TF 12-L
Dept. of Anatomy and Histology
FVS, BAU, Mymensingh-2202.

Recommended and Forwarded


20.11.2016

Prof. Dr. Md. Atiqur Rahman Khokon
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Project Completion Report (PCR) on

INVESTIGATION ON LIVESTOCK DISEASES AND DEVELOPMENT OF APPROPRIATE CONTROL MEASURES IN HILLY AREAS (TF 12-L)

Submitted To:

**Executive Director
Krishi Gobeshona Foundation (KGF)
AIC Buidling (3rd Floor), BARC Complex,
Farmgate, Dhaka-1215**



Submitted By:

**DR. SHONKOR KUMAR DAS
Professor
Principal Investigator (PI) cum
Project Coordinator (PC)
Department of Anatomy and Histology,
Faculty of Veterinary Science,
Bangladesh Agricultural University,
Mymensingh-2202, Bangladesh**

Date: 20 November 2016

Contents

Sl. No.	Title	Page No.
1.	Title pages	i
2.	Basic project information	4
3.	Executive summary	4
4.	Introduction	6
5.	Objectives	7
6.	Detailed Technical Report	7
7.	Highlights of Research Findings	20
8.	Conclusion	21
9.	Recommendations	21
10.	Financial & Bank statements	22
11.	Self-Assessment of the Project	25
12.	Tables	27
13.	Image gallery	57
14.	Relevant publications	82
15.	Questionnaire models (for General & Production data)	93
16.	Monthly report model	99
17.	Leaflet/Project brief model	104
18.	Brochure model	108
19.	Animal health card model	119
20.	Sample diagnosis format	122
21.	Poster/Pana model	123
22.	Farmers' training module	128
23.	List of veterinary medicines and chemicals	154
24.	Farmers' list	155

PROJECT COMPLETION REPORT (PCR)-COMPILED

Project Title: **Investigation on livestock diseases and development of appropriate control measures in hilly areas**

Project code/ID No: **TF 12-L (2013)**

Project Duration: 36 Months, From 05 September 2013 to 04 September 2016

CGP Project: KGF BKGET 1st Call

Submitted to:

Executive Director

Krishi Gobeshona Foundation (KGF)
AIC Building (3rd Floor), BARC Campus,
Farmgate, Dhaka-1215

Submitted by:

Dr. Shonkor Kumar Das

Professor

Principal Investigator (PI) cum Project Coordinator (PC)
Department of Anatomy and Histology, FVS
Bangladesh Agricultural University
Mymensingh-2202

Date: 20 November 2016

PROJECT COMPLETION REPORT (PCR)-COMPONENT

Project Title: **Investigation on livestock diseases and development of appropriate control measures in hilly areas**

Project code/ID No: **TF 12-L (2013)**

Project Duration: 36 Months, From 05 September 2013 to 04 September 2016

CGP Project: KGF BKGET 1st Call

Submitted to:

Executive Director

Krishi Gobeshona Foundation (KGF)
AIC Building (3rd Floor), BARC Campus,
Farmgate, Dhaka-1215

Submitted by:

Dr. Shonkor Kumar Das

Professor

Principal Investigator (PI) cum Project Coordinator (PC)
Department of Anatomy and Histology, FVS
Bangladesh Agricultural University
Mymensingh-2202

Date: 20 November 2016

Project Completion Report (PCR)

on

Investigation on livestock diseases and development of appropriate control measures in hilly areas

CGP Projects: KGF BKGET 1st Call

Project Duration: 36 Months, From 05 September 2013 to 04 September 2016

A. Basic Project Information: [should contain the following:]

- i. Project ID No: **TF 12-L**
- ii. Project Title: **Investigation on livestock diseases and development of appropriate control measures in hilly areas**
- iii. Name of Coordinator (if applicable): **Dr. Shonkor Kumar Das**, Professor, Department of Anatomy and Histology, Faculty of Veterinary Science, Bangladesh Agricultural University, Mymensingh-2202
- iv. Name of Principal Investigator: **Dr. Shonkor Kumar Das**, Professor, Department of Anatomy and Histology, Faculty of Veterinary Science, Bangladesh Agricultural University, Mymensingh-2202
- v. Name of Co-investigator (if any):
 - a. **Dr. Sonia Parvin**, Assistant Professor, Department of Medicine, Faculty of Veterinary Science, Bangladesh Agricultural University, Mymensingh-2202
 - b. **Kbd. Ashoke Kumar Hira**, Senior Program Coordinator, Proshika, Mirpur, Dhaka
- vi. Name of the applying organization with address: **Bangladesh Agricultural University (BAU)**, Mymensingh-2202
- vii. Name of associate/collaborating organization(s), if any: **PROSHIKA**, Mirpur, Dhaka
- viii. Project duration (months): **36 (From 05 September 2013 to 04 September 2016)**
- ix. Project commencement date (As per MoU): **05 September 2013**
- x. Project locations/sites: **Bandarban sadar, Lama and Rowangchari in Bandarban**
- xi. Project size (no. of participatory farmers, land area (ha), no. of animals, no. of ponds included in project activities per site etc.)
 - a) **Bandarban sadar**: 50 participatory farmers and 400 animals
 - b) **Lama**: 50 participatory farmers and 300 animals
 - c) **Rowangchari**: 50 participatory farmers and 300 animals
- xii. Project cost (total) **TK. 69,76,000/-** (Year-1: **TK. 26,22,100 /-**, Year-2: **TK. 22,37,100/-**, Year-3: **TK. 21,16,800/-**)
- xiii. Fund received in **TK. 66,27,039/-** & Expenditure made in **TK. 66,19,177/-** until today.

B. Summary/Executive Summary: [A clear and concise statement in simple language, including a short description of the research problem, project activities, approaches and methodologies followed to address the problem for achieving the objectives, activities performed and outputs/results achieved with conclusion during the project period. In short, this section should reflect the entire Project Completion Report (PCR) concisely but clearly]

To investigate the livestock diseases and development of the appropriate control measures in hilly areas, a three (3) years long collaborative research project (KGF-BAU-Proshika, ID: TF 12-L) was completed in hilly district Bandarban. Three upazillas (Bandarban sadar, Rowangchari and Lama) were randomly selected with 500 beneficiaries (200 for Bandarban sadar, 150 for Rowangchari and 150 for Lama) and 1000 animals (400 for Bandarban sadar, 300 for Rowangchari and 300 for Lama) as cattle, goat and pig. Hilly livestock are little bit different as hilly areas are not as same as the plane land not only regarding the land's nature, feeds & fodders but also communication/transportation. Copacetic activities were performed following the work plan to get the expected results of the project during this reporting time period. The necessary medicines, vitamin-mineral premix, supplements, vaccines, chemicals and consumables were distributed among the farmers of the respected three

upazillas. The vaccines were also distributed to the non-affected animals for the proper immunization and protect them from various diseases as prevention is more effective in hilly areas rather than treatment. The vitamin-mineral premixes were also provided to the sick and cachectic animals to recover their health condition and increase the milk production. Regular monitoring and visits was performed by the PI, CIs, Research Assistant and Field Assistants in the project areas. Need based/emergency treatments and follow-up were also conducted for ensuring good health of the hilly livestock. The Research fellow and the Field Assistants collected the samples from the hilly livestock at regular interval to detect the etiological agents and find out the proper solution for these type of diseases. The samples (of FMD, BQ, Mastitis, Tetanus, PPR & RWI) were collected aseptically using 50% buffered glycerine in cryovial/ice box/cool box from the infected/diseased animals. Then the samples were sent to BAU/CDIL by following the scientific ways of shipments and were tested. The up-to-date information about the project was recorded and monthly reports were regularly submitted by the Field Assistants from the respected areas. The data about the diseased animals was also collected from the DLS, Bandarban and analyzed.

On completion of three years, it was observed that the prevalence of livestock diseases in the project areas was FMD 5.06%, Anthrax 2.23%, BQ 0%, HS 2.03% & Mastitis 3.85% in cattle; PPR 10.98%, Rabies 0.4%, Goat pox 3.25% & Tetanus 4.47% in goat and Indigestion 15.92%, RWI 12.65% & Ectoparasite 8.98% in pig. The cumulative risk factors analysis revealed that no ventilation, poor animal health condition and animal treated by owners himself ranked 1st, 2nd and 3rd to cause these diseases. The overall treatment rate in hilly areas were cattle 15.92%, goat 16.84% and pig 12.56% whereas the vaccination rate were FMD 73.6%, BQ 25.2% in cattle, PPR 86.8% in goat and FMD 12.8% in pig. In a same analysis, it was also found that the recovery rate was 99.6%, 99.46% & 99.33% and mortality rate was 0.40%, 0.54% & 0.67% in cattle, goat & pig, respectively. The Research Fellow and the Field Assistants collected the samples from the hilly livestock at regular interval for confirmatory diagnosis and to find out the proper remedies for the aforesaid diseases. The samples were collected aseptically from the infected parts of the diseased animals. Feces (Endoparasite), skin scrapings (Ectoparasite & Pox), milk (Mastitis), blood/serum/tissue/swab (FMD, Anthrax, HS, PPR, Tetanus etc.), muscle tissue/pus (BQ), liver, kidney, spleen (Anthrax), heart (FMD), saliva/brain (Rabies) were collected from the disease suspected animals. Then the samples were sent to BAU by following the scientific ways of shipment of samples. The samples were tested in different laboratories of BAU, and additionally in CDIL, Dhaka for confirmatory diagnosis. The samples' confirmatory diagnosis by laboratory test revealed that in cattle there were 65 test positive samples (FMD: 25, Anthrax: 11, BQ: 0, HS: 10, Mastitis: 19); 47 test positive samples in goat (PPR: 27, Rabies: 1, Pox: 8 & Tetanus: 11) and 93 test positive samples in pig (Indigestion: 39, RWI: 32, & Ectoparasite: 22).

The production data is an indication of present production state that will be compared to evaluate the improvement of hilly livestock in the view of health and production later. The production data revealed that the average cattle milk production in hilly areas was 2.92 litre/cow/day (which was higher than that of the previous year/one 2.62/litre/cow/day) and average goat milk production in hilly areas was 0.36 litre/doe/day. And, average price of pig meat in hilly areas was 217.33 BDT. The most important problems found in the hilly areas were-lack of suitable grazing land/field, financial limitation and available bushy areas/huge mosquitoes. The survey and face-to-face discussion with veterinary researchers, field veterinarians (VS/ULO/DLO), MS/PhD students and some relevant teachers in Faculty of Veterinary Science, BAU were completed on 'Field Diagnostic Techniques' for the cattle (FMD, Anthrax, BQ, HS and Mastitis), goat (PPR, Rabies, Pox and Tetanus) and pig diseases (Indigestion, RWI and Ectoparasite) and a comparative chart was made which reflected that in the field most of livestock diseases were diagnosed based on clinical findings/visual inspection. A short training for the Field Assistants and two Farmers' Trainings were also completed using appropriate training modules. Advice/suggestions for hygienic improvement (personal/animal/farm) were also given. Audit for field areas in Bandarban and laboratory visit in BAU in each year were

also faced. The relevant publications were also made for the research results of this project where a MS student also completed his MS degree. The up-to-date information about the project was recorded and monthly reports were regularly submitted by the Field Assistants from the respected areas. The data about the diseased animals was collected from the DLS. The DLS data had been compared with monthly report data to evaluate the improvements among the target farmers. Necessary tables comparing the present results, baseline & control data with DLS data were also made. The recommended posters/panas and brochure were prepared and used in the project areas.

The activities of the project were completed smoothly to get the desirable outcomes which were predicted previously. The project offered ample opportunities for the development of appropriate control measures for the hilly livestock diseases on proper treatment, vaccination and management facilities are provided.

C. Introduction: [Should contain background details and rationale with a precise statement of the problem, its importance in relation to productivity, socio-economic and environmental aspects and an overview of the purpose and scope of the study that leads to the development of the specific objectives]

It is well known that hilly areas are less-focused considering not only human health but also livestock. There seems not to have appropriate investigation for the existing maladies and problems, also a lack of area-targeted and need-based intensive investigations for better remedies and to develop suitable economic disease control systems. Due to troublesome transportation, veterinary service is far from the farmer's doorstep which causing further boosting the death toll for hilly livestock and their production is hindering. Usually women remain involve in the management of mini livestock farming in the hilly areas. Therefore, they could have a better role for the better management of their animals on proper training that will also aid in women empowerment. Besides, the livelihood of the farmer family will be improved and nutrition level may increase. In addition, these tribal/minority groups will get access to the main stream of Bangladesh as well as they will be financially established in the society. In addition, this is no longer to explain that this work was praiseworthy and had a great environmental impact also.

As the tribal people are hilly areas are less-educated and not efficient to rear the livestock properly, our staffs and workers taught them the right path for livestock management with knowledge on how to keep the environment hygienically safe. Proper use and disposal of the wastages were also taught for further environmental betterment for both livestock and mankind.

The project will be implemented chiefly by Department of Anatomy and Histology and Medicine of BAU in Mymensingh, and Proshika with in upazillas (Bandarban sadar, Rowangchari and Lama) with 500 beneficiaries (200 for Bandarban sadar, 150 for Rowangchari and 150 for Lama) and 1000 animals (400 for Bandarban sadar, 300 for Rowangchari and 300 for Lama) as cattle, goat and pig. The project offered ample opportunities for the development of appropriate control measures for the hilly livestock diseases. The project was successfully completed and the farmers of those particular areas were highly benefitted and their prevalence of the specific diseases was reduced significantly and income of the farmers was also increased substantially.

D. Specific Project Objective(s): (As per FRP/PIR)

1. Investigation on livestock disease prevailing in the project areas.

2. Sorting and listing up the prime diseases with etiological study.
3. Development of appropriate methods for a safer control system with subsequent applications.
4. Improvement of knowledge and skill of the farmers on the specific diseases and management.

E. Detailed Technical Report: [Should consist of the following]

a. Statement of the Researchable Problem: [Provide a detailed statement of the problem, focusing its severity and extent along with baseline situation/data, preferably in quantitative term for which the project was designed]

Livestock population in Bangladesh in 2007-2008 was cattle 23 million, Buffalo 1.3 million, Goat 21.6 million, Pig 0.2 million (Livestock Album, Bandarban-2010), but these populations are not evenly distributed. In geographical locations, the hilly areas in Bangladesh are mainly in Chittagong, Rangamati, Khagrachhori, Bandarban and Sylhet districts. Owing to the tribal habitants and hilly communications, the livestock population is neglected here although they have a high number of livestock here (Samad et al., 1996). The cattle, goat, pig and buffalo population of the Bandarban sadar, Lama and Rowangchhari are 15770, 11378 & 9377; 8182, 6617 & 5505; 124, 322 & 131 and 65, 128 & 95 respectively (BBS, 2008 & DLS, Bandarban); among which cattle population is always high in each area. In addition, these tribal people are chiefly dependent on these livestock. However, a large number of small-scale farmers facing several disease related problems and their production is hindering. In fact, they need problem related solutions that is only possible by providing them training, build up capacity, awareness and an appropriate disease control system.

Livestock in Bandarban district is facing several diseases like Babesia, Anthrax, FMD, Papilloma and skin diseases, especially ecto-parasitic diseases and the livestock mortality is about 20-22% there due to these diseases (Livestock Album, Bandarban, 2010). Among them, skin disease is very common problem that sometimes becomes zoonotic also (Vet. Hospital data, Bandarban Sadar, 2012). The reported etiology is due to bacteria, viruses, fungi, protozoa and helminthes have been recognized to be associated there. Here the livestock are highly prone to protozoan diseases like Malaria, Babesiosis and Anaplasmosis due to abundant areas for mosquito's reproduction. Availability of bushy areas causing ectoparasitic infestation (Islam *et al.*, 2006). The people of the tribal areas are less careful about their livestock and parasitic prevalence is higher.

The people in these areas are poorly educated and not so hygienic that might be another cause associated with skin disease here that decreasing the yield of the livestock and financial return and increasing the cost of their maintenance considerably.

These afore-mentioned diseases have been recognized as one of the most important limiting factors in the livestock production but this situation is further deteriorated because of continuous and indiscriminate uses of antibacterial drugs which has been found to result in the emergence of drug resistance by pathogenic bacteria, but very few such reports has been made under local conditions. Considering these factors, this work is designed to sort the prime livestock diseases here and to offer suitable disease control systems in these hilly areas under a farm and rural conditions in Bangladesh.

b. Research Approaches and Methodologies: [The approaches and methodologies used for research work to address the above problem during the project period should briefly described]

i. Approaches: [Make the clear statement on the way/steps followed as well as institutional arrangements made for the implementation of the project activities such as, collaborative/participatory/on-station/on-farm/lab. etc. along with institutional support and supervision.]

The project was collaborative one and being implemented jointly by the Department of Anatomy and Histology and Department of Medicine in BAU, Mymensingh, and PROSHIKA, a non-govt. organization. BAU was acted as a leading organization which implements, monitor, analyze data and samples from diseased animals, prepare reports and financial management of the project. PROSHIKA was an associate organization which was responsible for day-to-day supervision, data collection and sample collection with shipment from the diseased animals.

ii. Methodologies: [Give stepwise clear statement on the research activities experiments/studies) undertaken along with materials and methods clearly indicating and frequency of data collection. The statistical tools applied for data analysis should be stated]

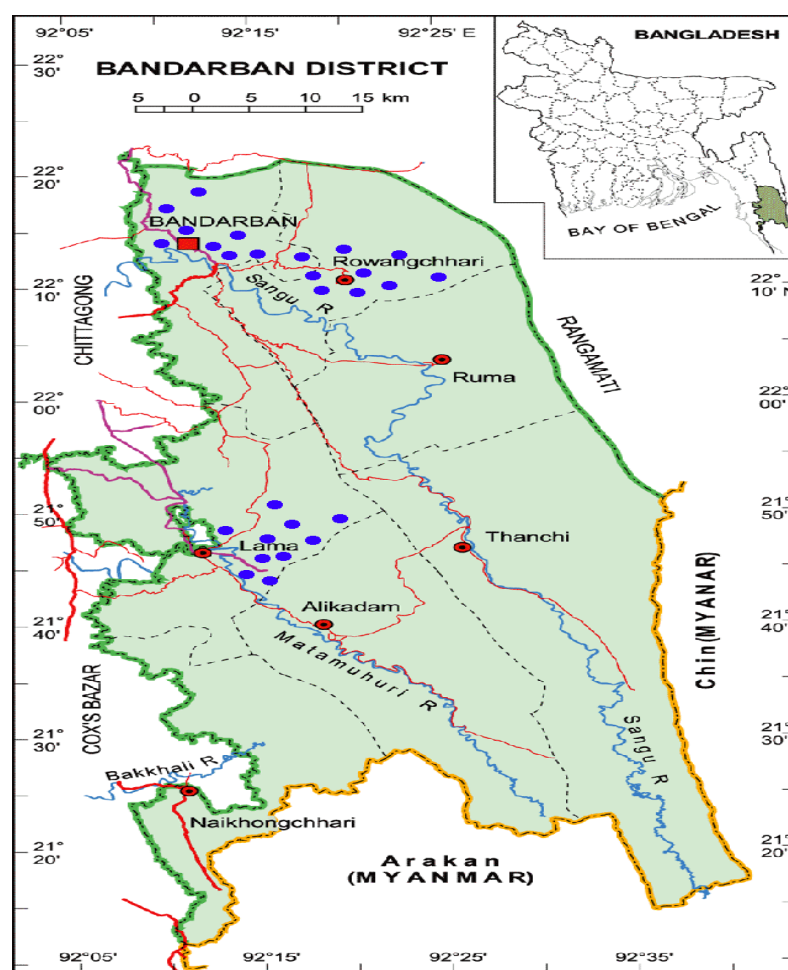


Fig. 1: Project areas (blue dotted color)

Project area:

Three livestock areas from livestock zone of Bangladesh were selected as Bandarban sadar, Lama and Rowangchhari (Fig. 1). Data collection was conducted by PROSHIKA. PROSHIKA already had their

Area Development Center (ADC) /office in these areas. List of the farmers of these aforesaid areas are given in **page 155**.

Animals:

Three upazillas (Bandarban sadar, Rowangchari and Lama) were randomly selected with 500 beneficiaries (200 for Bandarban sadar, 150 for Rowangchari and 150 for Lama) and 1000 animals (400 for Bandarban sadar, 300 for Rowangchari and 300 for Lama) as cattle, goat and pig. Different aged livestock were included in this study. The 500 beneficiaries were selected for the supplementation of vit-mineral and anthelmintic with veterinary facilities. The regular monitoring and data were collected from them. Within the 500 farmers, 150 lead farmers got selections for training to increase the number of skilled and knowledgeable persons in the project areas.

Supervision and monitoring:

PROSHIKA recruited three Field Assistants having training on livestock for its three area offices located in the project areas. After initial training of the Field Assistants by the PI/CI about data collection and other activities, they were shifted to their respective areas. The Field Assistants were provided a motor cycle and mobile. The farms were under routine surveillance by the Field Assistants and monitored by the PI/CI by direct field visits and over phone. CI (PROSHIKA) and livestock program personnel were kept regular contact with Field Assistants and provided necessary advice as required. Farmers also had the Field Assistant's mobile number so that they could contact the Field Assistants in urgency. Upazila Veterinary Surgeons of each project area were linked with the Field Assistants of the project areas and made available to the farmers whenever necessary (**Fig. 2**). Besides, PI & CI made regular visits as well as whenever required and contacted with the Field Assistants over phone. In case of morbidity and mortality, Field Assistants urgently contacted with PI over phone. PI gave necessary advice or made necessary arrangements to solve the problem as required. Questionnaires were prepared to collect epidemiological data and laboratory samples. For initial epidemiological investigation, duly filled questionnaires were collected by the CI (PROSHIKA) from Field Assistants, rechecked and sent to the PI (Department of Anatomy and Histology). PI assigned Research Fellow to take necessary steps to entry and analyze the data to find out the results.

The epidemiological factors that considered in the questionnaire were:

1. Etiological factors, e.g. Bacteria, virus, nutritional status, etc.
2. Animal level factors e.g., Body weight, health status, sex and age etc.
3. Management factors, e.g., Housing, feeding etc.
4. Seasonal factors
5. Others

In these areas, the Field Assistant maintained a record for the livestock diseases level factors *e.g.*, weight, health status, sex and age, etc. if any using a pre-tested questionnaire and motivated or demonstrated to rear the livestock in local areas or in small-scale farm condition. Field Assistant also kept record for the disease progress and mortality monthly.

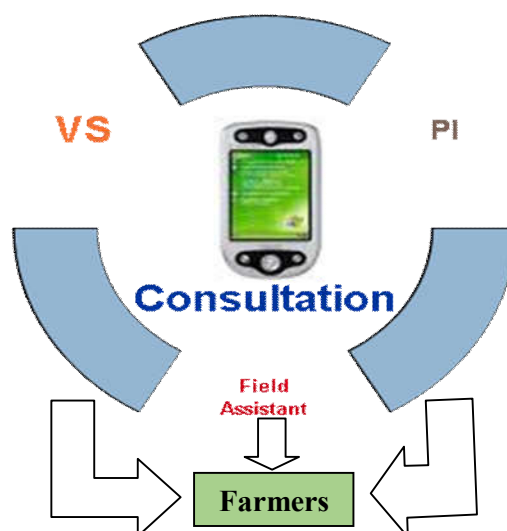


Fig. 2. System of intervention to reduce these diseases in the project areas

Treatment and sample collections:

The Field Assistants used to visit the farmers house regularly to observe the health condition of hilly livestock. Regular contact was also made by the Research Assistant with farmers either by direct visit or by telephone (when possible). When health problem occurred, Field assistants contacted PI (Anatomy and Histology). PI gave advice to the Field Assistants/VFA for the correction or in necessary case PI/CI contacted ULO / Veterinary surgeon of the respective areas to attend the case or CI/PI rushed to the field whenever it was necessary. Samples were collected by Field Assistants and Research Assistant from the sick animals and sent to the PI directly with duly filled shipment form. All owners of animals were provided an “Animal Health Card” (page 119) for each animal to record health related data by Research Assistant.

Intensive vaccination:

Intensive vaccination (Ring vaccination/Periphery vaccination) was done and, zone for some of the important diseases were also selected.

Diagnostic methodology analysis:

The standardization of some specific diagnostic techniques were done by collecting the relevant literatures for the standard and practicing/field methods for the cattle (FMD, Anthrax, BQ, HS and Mastitis), goat (PPR, Rabies, Pox and Tetanus) and pig diseases (Indigestion, RWI and Ectoparasite) and a comparative chart was made with usable recommendation after necessary survey.

Sample collection for bacterial diseases:

Disease name	Samples	Collection site	Preservation	Shipment
Anthrax	Blood	From the ear vein	Store at 4°C if can't reach	4-8°C / within
Black Quarter (BQ)	Tissue/Pus	Taken from affected area		

Haemorrhagic Septicemia (HS)	Serum/Swab	Blood was collected from jugular vein and serum was separated from blood	laboratory in 24h	cool box with ice
Mastitis	Milk	Directly from udder		
Tetanus	Blood	From jugular vein		

For confirmatory diagnosis of bacteria, the above mentioned samples were collected from the hilly livestock.

Sample collection for viral diseases:

Disease name	Samples	Collection site	Preservation	Shipment
FMD	Blood/Tissue	From jugular vein	Store at 4°C if can't reach laboratory in 24h	4-8°C / within cool box with ice
PPR	Blood	From jugular vein		
Rabies	Brain/Saliva	On post-mortem		
Pox	Scrapings	From affected areas		

For confirmatory diagnosis of virus, the above mentioned samples were collected from the hilly livestock.

Sample collection for parasitic diseases:

Disease name	Samples	Collection site	Preservation	Shipment
Indigestion	Faeces	Directly from rectum/soon after defecation	Mix with 10% formalin	4-8°C / within cool box with ice
Round Worm Infection (RWI)	Faeces	Directly from rectum/soon after defecation		
Ectoparasite	Skin scrapings	From affected areas	Room temperature	

For confirmatory diagnosis of parasite, the above mentioned samples were collected from the hilly livestock.

Commonly used model for specimens labeling:

Patient's name:

Clinical specimen:

Unique ID number (Research/Outbreak):

Specimen type:

Date, time and place of collection:

Name/ initials of collector:

Deworming schedule:

Name	Source	Dose	Route	Times	Date/intervals
Endex®	Pharmaceutical company	1 tab/70kg bw	Oral	8.00 am	

Renadex®	Pharmaceutical company	1 tab/70kg bw	Oral	8.00 am	After every 3 (three) months interval
Helmex®	Pharmaceutical company	1 tab/80kg bw	Oral	8.00 am	
Tetranid®	Pharmaceutical company	1 tab/150kg bw	Oral	8.00 am	
Vermic®	Pharmaceutical company	1 ml/50 kg bw	S/C	8.00 am	
Piper vet®	Pharmaceutical company	5-10 gm/calf	Oral	8.00 am	

Sample analyses:

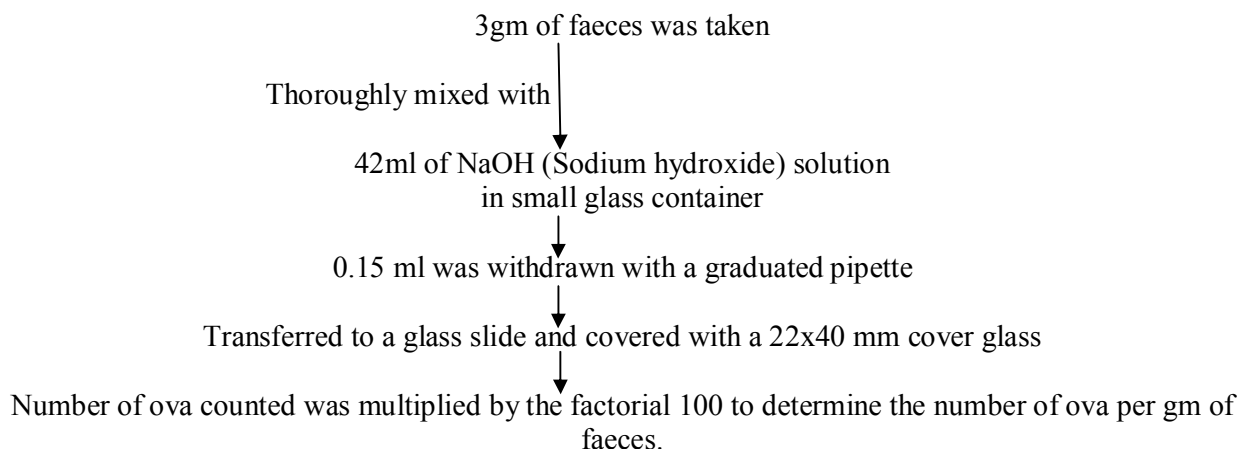
After receiving samples and filled form, necessary steps were taken by PI for the analyses.

Parasitic Examination:

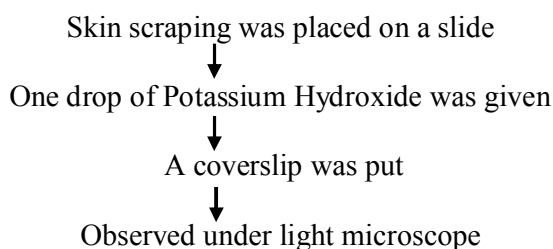
Fecal sample collection and examination:

Identification of parasitic infection by the morphology of eggs is a strong systematic criterion. The faecal samples were collected directly from the rectum of the animals or from the fresh faecal mass immediately after defecation. The samples were examined in the field and in the Laboratory of Anatomy/Medicine, Bangladesh Agricultural University, Mymensingh soon after collection or after preservation by 10% formalin for shipment. The standard techniques and criteria as described by Soulsby (1986) and Theinpont *et al.* (1979) were followed for faecal examination and identification of eggs.

Stoll's ova counting method:



Detection of Ectoparasite:



Parasitic disease diagnosis:

Diseases name	Samples	Diagnosis procedure
Indigestion	Faeces	Stoll's ova counting method/Identification of eggs

Round Worm Infection	Faeces	Stoll's ova counting method/Identification of eggs
Ectoparasite	Skin Scrapings	The procedure was mentioned above

Bacteriological examination:

The samples were collected aseptically and carried directly in the Department of Anatomy and Histology and Medicine. Then the samples were inoculated in the nutrient broth soon after receiving. Afterwards, the bacteria were isolated in standard /specific media, PCR, ELISA, or other tests.

Mastitis detection (Surf excel method):

3 gm surf excel® (Detergent) + 100 ml distilled water was diluted together



3 ml milk was added with dilution



The mixture was shaken vigorously



Cloudy clotting was formed

Bacterial disease diagnosis:

Diseases name	Samples	Diagnosis procedure
Anthrax	Blood	PMB staining of blood smear
Black Quarter	Tissue/ Pus	Culture and staining of the organism
Haemorrhagic Septicemia	Serum/ Swab	Culture and staining of the organism
Mastitis	Milk	Rapid mastitis detection (Surf excel method)/CMT kit
Tetanus	Blood	Tetanus toxoid IgG/Tetanus antibody ELISA kit

Virological examination:

Samples were subjected either to HA/HI, ELISA/PCR or RT-PCR/PAGE for the identification of virus if necessary.

Viral disease diagnosis:

Diseases name	Samples	Diagnosis procedure
FMD	Blood/ Tissue	ELISA
PPR	Blood	ELISA diagnosis kit for PPR
Rabies	Brain/ Saliva	Rapid test (Anigen Rapid Rabies Ag Test Kit)/dFAT
Pox	Scrapings	Pox virus detection by RT-PCR/ELISA

Post-mortem Examination:

After any mortality, the carcass was subjected to post-mortem examination to find out the pathological lesions produced by a specific organism and samples were collected as required to identify the cause of the death.

Histopathological Examination:

Samples collected at post-mortem were subjected to histopathology (Lab. of Anatomy) to know the tissue level changes of a specific pathogen. Histology is essential for the study of organs at cellular level. For this why, histological slide preparation is necessary. The following steps were taken to visualize the cells and its structure with the help of microscope.

Histological samples were collected, preserved and processed for paraffin block. Then the blocks were sectioned by rotary microtome and stained with H & E stain to observe under microscope.

Collection of production and control data:

The production & control data were collected from the project areas at different times using specific data collecting questionnaire model. The production data is an indication of present production state that will be compared to evaluate the improvement of hilly livestock in the view of health and production later.

Survey for diagnostic methodology analysis:

The survey and face-to-face discussion with veterinary researchers, field veterinarians, MS/PhD students and some relevant teachers in Faculty of Veterinary Science, BAU were completed for the standardization of some specific diagnostic techniques were done for the cattle (FMD, Anthrax, BQ, HS and Mastitis), goat (PPR, Rabies, Pox and Tetanus) and pig diseases (Indigestion, RWI and Ectoparasite) and a comparative chart was made with necessary/usable recommendation.

Data Analyses:

Data were analyzed with the SPSS computer program. Colleagues from Department of Agricultural Statistics consented to help in analyses.

Farmers' Training:

A **short training** program have been organized to trained-up the Field Assistants about sample collection, preservation, shipment, monitoring, data collection and field activities on 8th February 2014 at Bandarban sadar upazila in Bandarban district. The Field Assistants learned both theoretically and practically about the above said skills. Special farmers training also have been conducted to trained-up the farmers.

A standard module has been developed based on the practical experience and survey data. The module was enriched in information for the farmers that's why the farmers can easily understand the messages. Highly skilled and knowledgeable trainer was selected for the training. Three days long **Farmers' Training** was organized in each area. Twenty five (25) lead farmers were in each batch. The training programme of Bandarban sadar and Rowangchari were held on 21 May to 23 May and 24 May to 26 May, 2014 at Bandarban plaza, Bandarban sadar. The farmer's training programme was held on 18 May to 20 May, 2014 at Lama upazila. The training was given on livestock rearing, their important diseases, treatment, hygienic management and control in hilly areas. Both theoretical and practical knowledge was conducted by the trainers. The learning and sharing of knowledge were two way communications. Both farmers and the trainers became benefited to teach and learn. The training was successfully completed.

The second **Farmers' Training** was organized in each area as the previous one at Hotel Plaza Bandarban from 11 to 13 August 2016 using appropriate farmers' training module.

c. Results and Benefits: [The accomplishments made during the project period in achieving the project objectives should be described along with pertinent data. Only summary data in the form of table/figure along with adequate discussion and literature citation should be presented in the text. However, detailed data and references should be given as annexure. You must show outputs clearly against objective-wise activities as given below. The benefits of the accomplishments *i.e.*- outputs/results should also be described]

(i) List objectives-wise activities clearly, resulting in specific outputs(s), such as-

Specific Objective (s)	Planned activities performed against each objective	State progress made clearly during the reporting period against each activity	Outputs/results achieved during this period
1. Investigation on livestock disease prevailing in the project areas	<p>1.1 Selection of farmers in the project areas</p> <p>1.2 Development of questionnaire, data collection and analysis</p> <p>a. Retrospective disease data collection</p> <p>b. Baseline data collection</p> <p>c. Epidemiological data collection</p> <p>1.3 Collection of production data</p> <p>1.4 Analysis of data</p>	<p>1.1 Selection of farmers was completed based on the availability of livestock. Total 500 farmers were selected by the field assistants in respective areas among these - 200 in Bandarban sadar, 150 in Lama and 150 in Rowangchari (page 155).</p> <p>1.2 Development of questionnaire and pre-testing was successfully done. Data collection and analysis in the respective areas was completed (page 93, 97).</p> <p>1.3 The production & control data were collected from the project areas.</p> <p>1.4 Analysis of data has been completed (Table 1, 5,11, 24-26).</p>	<p>Farmers of the respective areas were selected and a standard questionnaire was developed by pre-testing.</p> <p>The data represented the present scenario of prevailing diseases in project areas are shown in research progress report.</p>
2. Sorting and listing up the prime diseases with etiological study	2.1 Sample collection, testing and analysis	2. 1 The samples' confirmatory diagnosis by laboratory test revealed that in cattle there were 65 test positive samples (FMD: 25, Anthrax: 11, BQ: 0, HS: 10, Mastitis: 19); 47 test positive samples in goat (PPR: 27, Rabies: 1, Pox: 8 & Tetanus: 11) and 93	The diseases were confirmed by these laboratory tests.

	2.2 Standardization of identification methods	<p>test positive samples in pig (Indigestion: 39, RWI: 32, & Ectoparasite: 22) (Table 4, 15-17).</p> <p>2.2 The survey and face-to-face discussion with veterinary researchers, field veterinarians, MS/PhD students and some relevant teachers in Faculty of Veterinary Science, BAU were completed for the standardization of some specific diagnostic techniques were done for the cattle (FMD, Anthrax, BQ, HS and Mastitis), goat (PPR, Rabies, Pox and Tetanus) and pig diseases (Indigestion, RWI and Ectoparasite) and a comparative chart was made with necessary/usable recommendation (Table 7).</p>	Easy, quick, cheaper & appropriate diagnostic techniques are now available for recommendation to be used in the fields.
3. Development of appropriate methods for a safer control system with subsequent applications	3.1 Treatment & supplementation, response to treatment with follow-up and implementation of better management system	3.1 The livestock in the projected areas were supplied with veterinary medicine and vit-mineral premix to reduce the parasitic burden and nutritional deficiency. The overall treatment rate in hilly areas were cattle 15.92%, goat 16.84% and pig 12.56% whereas the vaccination rate were FMD 73.6%, BQ 25.2% in cattle, PPR 86.8% in goat and FMD 12.8% in pig (Table 3, 14).	Parasitic burden and nutritional deficiency reduced. Awareness increased to treat the diseased livestock. The people become encouraged to use drugs. It was also found that the recovery rate was 99.6%, 99.46% & 99.33% in cattle, goat & pig, respectively (Table 3, 14).
4. Improvement of knowledge and skill of the farmers on the specific disease and management	4.1 Farmers training	<p>4.1 Two trainings were completed in the project areas. Field Assistant training was organized in last year on 8th February 2014 for sample collection, preservation, shipment and ABC on livestock diseases.</p> <p>Another Farmers' training programme was arranged and completed successfully in every project areas on 18-26 May 2014.</p>	FAs can now able to collect, preserve and send the samples using proper methods of shipment. Seventy five (75) farmers were trained up about different types of existing diseases and their management system.

		The second Farmers' Training was organized in each area as the previous one at Hotel Plaza Bandarban from 11 to 13 August 2016 using appropriate farmers' training module.	
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(ii) Outputs/Results: [Describe briefly but clearly the outputs/results obtained as a consequence of a particular activity (experiment/study) along with adequate discussion and literature citation]

On completion of research project for three years, it was observed that the prevalence of livestock diseases in the project areas was FMD 5.06%, Anthrax 2.23%, BQ 0%, HS 2.03% & Mastitis 3.85% in cattle; PPR 10.98%, Rabies 0.4%, Goat pox 3.25% & Tetanus 4.47% in goat and Indigestion 15.92%, RWI 12.65% & Ectoparasite 8.98% in pig. The cumulative risk factors analysis revealed that no ventilation, poor animal health condition and animal treated by owners himself ranked 1st, 2nd and 3rd to cause these diseases. The overall treatment rate in hilly areas were cattle 15.92%, goat 16.84% and pig 12.56% whereas the vaccination rate were FMD 73.6%, BQ 25.2% in cattle, PPR 86.8% in goat and FMD 12.8% in pig. In a same analysis, it was also found that the recovery rate was 99.6%, 99.46% & 99.33% and mortality rate was 0.40%, 0.54% & 0.67% in cattle, goat & pig, respectively. The Research Fellow and the Field Assistants collected the samples from the hilly livestock at regular interval for confirmatory diagnosis and to find out the proper remedies for the aforesaid diseases. The samples were collected aseptically from the infected parts of the diseased animals. Feces (Endoparasite), skin scrapings (Ectoparasite & Pox), milk (Mastitis), blood/serum/tissue/swab (FMD, Anthrax, HS, PPR, Tetanus etc.), muscle tissue/pus (BQ), liver, kidney, spleen (Anthrax), heart (FMD), saliva/brain (Rabies) were collected from the disease suspected animals. Then the samples were sent to BAU by following the scientific ways of shipment of samples. The samples were tested in different laboratories of BAU, and additionally in CDIL, Dhaka for confirmatory diagnosis.

The samples' confirmatory diagnosis by laboratory test revealed that in cattle there were 65 test positive samples (FMD: 25, Anthrax: 11, BQ: 0, HS: 10, Mastitis: 19); 47 test positive samples in goat (PPR: 27, Rabies: 1, Pox: 8 & Tetanus: 11) and 93 test positive samples in pig (Indigestion: 39, RWI: 32, & Ectoparasite: 22). The production data is an indication of present production state that will be compared to evaluate the improvement of hilly livestock in the view of health and production later. The production data revealed that the average cattle milk production in hilly areas was 2.92 litre/cow/day (which was higher than that of the previous year/one 2.62/litre/cow/day) and average goat milk production in hilly areas was 0.36 litre/doe/day. And, average price of pig meat in hilly areas was 217.33 BDT. The most important problems found in the hilly areas were-lack of suitable grazing land/field, financial limitation and available bushy areas/huge mosquitoes. The survey and face-to-face discussion with veterinary researchers, field veterinarians (VS/ULO/DLO), MS/PhD students and some relevant teachers in Faculty of Veterinary Science, BAU were completed on 'Field Diagnostic Techniques' for the cattle (FMD, Anthrax, BQ, HS and Mastitis), goat (PPR, Rabies, Pox and Tetanus) and pig diseases (Indigestion, RWI and Ectoparasite) and a comparative chart was made which reflected that in the field most of livestock diseases were diagnosed based on clinical findings/visual inspection. A short training g for the Filed Assistants and two Farmers' Trainings were also completed using appropriate training modules. Advice/suggestions for hygienic improvement (personal/animal/farm) were also given. Audit for field areas in Bandarban and laboratory visit in BAU in each year were also faced. The relevant publications were also made for the research results of this project where a MS student also completed his MS degree. The up-to-date information about the project was recorded and monthly reports were regularly submitted by the Field Assistants from the respected areas. The data about the diseased animals was collected from the DLS. The DLS data had been compared with monthly report data to evaluate the improvements among the target farmers.

Necessary tables comparing the present results, baseline & control data with DLS data were also made. The recommended posters/panas and brochure were prepared and used in the project areas. The activities of the project were completed smoothly to get the desirable outcomes which were predicted previously.

(iii) Benefit/Outcome: [Describe briefly the benefit/outcome accrued i.e. the gain in relation to productivity, social, economic and environmental aspects due to practical use of the output/result]

On completion of three years, the major benefits were:

1. **Abatement of disease prevalence:** The prevalence of livestock diseases in the project areas was FMD 5.06%, Anthrax 2.23%, BQ 0%, HS 2.03% & Mastitis 3.85% in cattle; PPR 10.98%, Rabies 0.4%, Goat pox 3.25% & Tetanus 4.47% in goat and Indigestion 15.92%, RWI 12.65% & Ectoparasite 8.98% in pig which were lesser than that of the baseline data.
2. **Unveiling the prime risk factors:** The cumulative risk factors were known as no ventilation, poor animal health condition and animal treated by owners himself who ranked 1st, 2nd and 3rd to cause these diseases.
3. **Providing a better treatment & vaccination rate:** A better treatment rate was provided to the hilly animals as cattle 15.92%, goat 16.84% and pig 12.56% whereas the vaccination rate were FMD 73.6%, BQ 25.2% in cattle, PPR 86.8% in goat and FMD 12.8% in pig.
4. **Attaining an appreciable recovery rate:** An excellent disease recovery was attained as 99.6%, 99.46% & 99.33% and mortality rate was 0.40%, 0.54% & 0.67% in cattle, goat & pig, respectively.
5. **Production was increased:** The production data revealed that the average cattle milk production in hilly areas was 2.92 litre/cow/day (which was higher than that of the previous year/one 2.62/litre/cow/day) and average goat milk production in hilly areas was 0.36 litre/doe/day. And, average price of pig meat in hilly areas was 217.33 BDT.
6. **Major problems were encountered:** The most important problems found in the hilly areas were-lack of suitable grazing land/field, financial limitation and available bushy areas/huge mosquitoes.
7. **Recommendation for 'Field Diagnostic Techniques':** The survey and face-to-face discussion with veterinary researchers, field veterinarians (VS/ULO/DLO), MS/PhD students and some relevant teachers in Faculty of Veterinary Science, BAU were completed on 'Field Diagnostic Techniques' for the cattle (FMD, Anthrax, BQ, HS and Mastitis), goat (PPR, Rabies, Pox and Tetanus) and pig diseases (Indigestion, RWI and Ectoparasite) and a comparative chart was made which reflected that in the field most of livestock diseases were diagnosed based on clinical findings/visual inspection.

d. Technology Developed: [State briefly the technology generated/validated and refined and policy instrument developed during the project period]

Not applicable, but treatment, vaccination and management strategies were developed and applied for bettering the livestock health and production.

e. Publications made/under process: [State whether the results achieved during the project period have been published/submitted for publication, including leaflet, booklet etc. If so, provide a list with complete information]

Seven (7) publications were made which were included as annexure from page 82 to 92.

f. Training/workshop organized: [Provide a list of training/workshop organized during the project period, if any with date, subject, target group, objectives and number of participants. Training materials used should be included as annexure]

The inception **workshop** was held on 8th February 2014 at District Livestock Office in Bandarban sadar. District Livestock Officer (DLO), Upazila Livestock Officers (ULOs), Veterinary Surgeons

(VSS), Veterinary Field Assistants (VFAs), Respective livestock personnel, Proshika personnel, Field Assistants (3), Research Fellow, selected farmers representatives/Lead farmers (25 farmers from Bandarban sadar 25 farmers from Lama and 25 Farmers from Rowangchari) were present in the inception workshop. Principal Investigator (PI) gave a brief about the project activities, objectives, purposes and expected outputs. DLO gave some valuable speech and direction of project to complete it successfully. The audience shared their comments and recommendations. Interaction between PI and attendants was cordial and fruitful.

A **short training** program have been organized to trained-up the Field Assistants about sample collection, preservation, shipment, monitoring, data collection and field activities on 8th February 2014 at Bandarban sadar upazila in Bandarban district. The Field Assistants learned both theoretically and practically about the above said skills. Special farmers training also have been conducted to trained-up the farmers.

A standard module has been developed based on the practical experience and survey data. The module was enriched in information for the farmers that's why the farmers can easily understand the messages. Highly skilled and knowledgeable trainer was selected for the training. Three days long training was organized in each area. Twenty five (25) lead farmers were in each batch. The **Farmers' Training** programme of Bandarban sadar and Rowangchari were held on 21 May to 23 May and 24 May to 26 May, 2014 at Bandarban plaza, Bandarban sadar. The farmer's training programme was held on 18 May to 20 May, 2014 at Lama upazila. The training was given on livestock rearing, their important diseases, treatment, hygienic management and control in hilly areas. Both theoretical and practical knowledge was conducted by the trainers. The learning and sharing of knowledge were two way communications. Both farmers and the trainers became benefited to teach and learn. The training was successfully completed.

The second **Farmers' Training** was organized in each area as the previous one at Hotel Plaza Bandarban from 11 to 13 August 2016 using appropriate farmers' training module.

g. Graduate Studies: [Indicate whether the research staff under this project are graduated or registered for M.S/PhD degrees. If so, the topic of these along with the registration/departmental certificate should be provided]

A MS student had completed his MS degree through this project. His particulars are mentioned below:

Name: MD. Ashraf Zaman Faruk

Roll No: 15 VAH JJ 03M

Reg. No: 43834

Session: 2015-2016

Title: Histomorphology of Bovine FMD at primary, advanced and recovery stages with hematological and biochemical changes in Bangladesh

Affiliation: Dept. of Anatomy and Histology, FVS, BAU, Mymensingh-2202

Supervisor: Prof. Dr. Shonkor Kumar Das

h. Linkage Developed: [Give a brief outline of the linkages developed with GO/NGO, if any during the project period]

A working linkage was developed during this project period (not documented) with CDIL, PRTC and Proshika.

i. Equipment/Appliances Purchased: [Give a list of equipment/appliances purchased with item-wise cost, if any during the project period]

The field and lab equipments were purchased. One computer, camera, printer and a microanalyser were purchased. Other necessary inputs, medicines, supplements, chemicals and consumables were purchased following the activity plan as mentioned in this project. The materials (chemicals, medicines, vaccines etc.) which were used to perform the activities of this project have been listed in **page 154**. Item –wise cost has been given in the financial statement section.

F. Highlight of Research Findings: [Give details of significant findings of the project, indicating their usefulness to and applicability by the end users]

Hilly livestock are little bit different as hilly areas are not as same as the plane land not only regarding the land's nature, feeds & fodders but also communication/transportation. Activities were performed following the work plan to get the expected results. The cumulative major research highlights were:

1. The prime livestock diseases causing death in the hilly areas are: for the cattle-FMD, Anthrax, BQ, HS and Mastitis, for the goat-PPR, Rabies, Pox and Tetanus and for the pig- Indigestion, RWI and Ectoparasite.
2. The prevalence of livestock diseases in the project areas was FMD 5.06%, Anthrax 2.23%, BQ 0%, HS 2.03% & Mastitis 3.85% in cattle; PPR 10.98%, Rabies 0.4%, Goat pox 3.25% & Tetanus 4.47% in goat and Indigestion 15.92%, RWI 12.65% & Ectoparasite 8.98% in pig.
3. The cumulative risk factors analysis revealed that no ventilation, poor animal health condition and animal treated by owners himself ranked 1st, 2nd and 3rd to cause these diseases.
4. The overall treatment rate in hilly areas were cattle 15.92%, goat 16.84% and pig 12.56% whereas the vaccination rate were FMD 73.6%, BQ 25.2% in cattle, PPR 86.8% in goat and FMD 12.8% in pig.
5. In a same analysis, it was also found that the recovery rate was 99.6%, 99.46% & 99.33% and mortality rate was 0.40%, 0.54% & 0.67% in cattle, goat & pig, respectively.
6. The samples' confirmatory diagnosis by laboratory test revealed that in cattle there were 65 test positive samples (FMD: 25, Anthrax: 11, BQ: 0, HS: 10, Mastitis: 19); 47 test positive samples in goat (PPR: 27, Rabies: 1, Pox: 8 & Tetanus: 11) and 93 test positive samples in pig (Indigestion: 39, RWI: 32, & Ectoparasite: 22).
7. The production data revealed that the average cattle milk production in hilly areas was 2.92 litre/cow/day (which was higher than that of the previous year/one 2.62/litre/cow/day) and average goat milk production in hilly areas was 0.36 litre/doe/day. And, average price of pig meat in hilly areas was 217.33 BDT.
8. The most important problems found in the hilly areas were-lack of suitable grazing land/field, financial limitation and available bushy areas/huge mosquitoes.
9. The survey and face-to-face discussion with veterinary researchers, field veterinarians (VS/ULO/DLO), MS/PhD students and some relevant teachers in Faculty of Veterinary Science, BAU on 'Field Diagnostic Techniques' revealed in the field most of livestock diseases were diagnosed based on clinical findings/visual inspection.

G. Conclusion: [A brief statement of one or two paragraphs should be given describing the conclusions drawn from the data collected/results achieved]

The prevalence of livestock diseases in the hilly areas was FMD 5.06%, Anthrax 2.23%, BQ 0%, HS 2.03% & Mastitis 3.85% in cattle; PPR 10.98%, Rabies 0.4%, Goat pox 3.25% & Tetanus 4.47% in goat and Indigestion 15.92%, RWI 12.65% & Ectoparasite 8.98% in pig at the end of this project which was achieved by our copacetic working strategies.

The hilly people are very industrious and cordial about any work. They need doorstep/on-spot veterinary service to control the livestock disease and also to abate the prevalence of livestock diseases. A proper and timely vaccination is very effective here rather than random treatments.

H. Recommendation: [State appropriate recommendations with extrapolation areas for putting conclusions into practices and also include future research need, if any]

The recommendations are which might be useful in future for national level use:

1. The hilly areas (also other constrained areas) are not same as the plane land.
2. Continuous communication must be made with the farmers during the work in hilly areas.
3. Intensive vaccination is very useful in the hilly areas to control the livestock diseases.
4. Counseling the farmers is very important to have the veterinary treatments and hygienic management as they have prejudice and misconception.
5. Working there with the help of the local people living there as there are some language problems.
6. Farmers Training is very helpful to make them confident to work in future independently.
7. DLS office should be more careful to give their veterinary service to all the farmers living in the remote areas.

J. Self-Assessment of the Project: [Please answer the following questions precisely and clearly]

1. Have you been able to achieve all the specific objectives of your project?-Yes
2. Who is/are the target beneficiary group/s of your project output/result?-Hilly farmers
3. How the project outputs/results obtained would benefit the target beneficiary group/s? And, how these could be transferred to that/those target group/s?-During the project period and trainings we have taught/demonstrated how the mortality rate can be abated and to keep the animals healthy using various methods. If the farmers follow these and apply accurately and timely, they will be benefitted definitely. Department of Livestock Service can take initiative to transfer such research results of other constrained areas of Bangladesh.
4. Do you think that you have successfully completed the project?-Yes.

Success story: During the baseline survey we have got the major points to work to achieve the objectives of our project. It was clear hearing from all types of hilly farmers that livestock services were far from their door-step. At the same time, they have some prejudice and misconceptions about treatment. Therefore, during our first Farmers training we have taught them about the prime diseases with their managements. On-spot treatment and counseling was our regular efforts with close monitoring. Then, we found that vaccination was very effective to decrease the disease incidence. Then, intensive vaccination was started and a better result was attained to make the mortality rate zero. The female farmers were also encouraged.

5. Please describe briefly the outcome/benefit and likely impact of your project on productivity, policy, society, economy and environment.

As the prevalence was decreased the animal will remain healthy which indirectly increase the production as well as boost up the farmers' economy. A better treatment and vaccination programme will also increase the productivity and will also abate the disease occurrences. Vaccination will also decrease the mortality rate that renders economical help to the hilly farmers. Farmers' Training directly increase the knowledge of the farmers thus to increase the management skills for a better production and hygienic environment. As the prime problems were indicated, measures can be taken easily for them. Other necessary recommendations will also be helpful.

K. Acknowledgements:

Sincere thanks go to-

1. Dept. of Microbiology and Hygiene, BAU
2. Dept. of Pathology, BAU
3. CDIL, Dhaka
4. PRTC, Chittagong
5. DLS office, Bandarban

L. Endorsement:

Principal Investigator (PI):

Name: Prof. Dr. Shonkor Kumar Das

Signature:



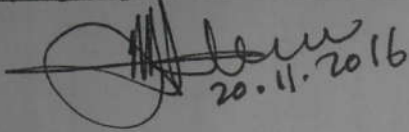
DR. SHONKOR KUMAR DAS
Principal Investigator (PI)
Investigation on.....hilly areas
KGF Project Code: TF 12- L
Dept. of Anatomy and Histology
FVS, BAU, Mymensingh-2202.

Seal:

Date: 20/11/2016

Head of Applying Organization/Authorized Person:

Name:



Signature:

Seal:

Date:

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[Note: Statement within [] are the guidelines/instructions which should be ignored during report preparation. Detailed results/data and references should be given as annexure.]